REMARKS/ARGUMENTS

Reconsideration of the application is requested.

Claims 4-7 remain in the application. Claim 4 has been amended. Claims 1-3 have been previously canceled.

In item 3 on page 2 of the Final Office action, claims 4-7 have been rejected as being unpatentable over Arbach et al. (U.S. Patent 5,021,129) (hereinafter "Arbach") in combination with Angelopoulos et al. (U.S. Patent 6,136,513) (hereinafter "Angelopoulos"), further in combination with Bickford et al. (U.S. Patent 5,800,858) (hereinafter "Bickford") and still further in combination with either Schupp et al. (U.S. Patent 4,596,759) (hereinafter "Schupp"), Beyne et al. (U.S. Patent 6,362,484) (hereinafter "Beyne"), or Conrad et al. (U.S. Patent 5,998,237) (hereinafter "Conrad") under 35 U.S.C. § 103(a).

Claim 4 has been amended to more clearly define the present invention. Support for the changes can be found at page 7, lines 22-25, page 7, lines 6-13, example 1 on page 11, and examples 5 and 7 on pages 12-14 of the instant specification.

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful. Claim 4 calls for, *inter alia*, a process for metallizing at least one insulating layer of an electronic or microelectronic component, by:

applying at least one first insulating layer to a substrate such that the first insulating layer has a thickness not greater than 50μm;

activating the entire first insulating layer by treatment with an activator, the activator being at least one of a gas, a liquid, a solution, and a plasma;

then, after activating the entire first insulating layer, applying and patterning a second insulating layer made of a photosensitive material; and

then, after applying and patterning the second insulating layer, seeding and metallizing regions of the first insulating layer that are exposed by the patterning step. (emphasis added)

Arbach does not disclose a photolithographic method, and does not disclose or suggest "applying and patterning a second

insulation layer made of a photosensitive material" as recited in claim 4. Arbach is completely silent with regard to providing process steps according to the present claimed invention.

Angelopoulos discloses a method for producing a conductive structure. A first dielectric layer (14) which is activated is applied onto a glass substrate (12). Subsequently, a second layer of polyacrylamid (16) is applied which serves as a bonding agent layer. A seed layer (18) is applied over the entire surface onto the second layer and subsequently, the seed layer is structured, i.e. a photo lacquer is applied, and the photo lacquer is exposed and removed in those areas where the lines are embodied. Thereafter, the photo lacquer must be removed (stripped). Finally, the lines are then embodied by a metallization and portions of the seed layer that cover the entire surface are removed in areas where no lines have been embodied, in order to avoid a short-circuit.

Contrary thereto, claim 4 specifies that a first insulation layer is applied on a substrate, and then the entire first insulation layer is activated. A second insulation layer is applied on the first insulation layer, which already has been activated by an activator. The second insulation layer is

made of a photo-sensitive material. Subsequently, after the entire first insulating layer is activated, the second photo-sensitive insulation layer is structured, so that areas of the activated first insulation layer are exposed. The exposed areas of the first insulation layer are subsequently seeded and metallized.

Using a second insulation layer, which is structured after being applied on the activated first insulation layer, is neither disclosed nor suggested in Angelopoulos.

In Angelopoulos, the seed layer is seeded, which is embodied on the polymeric auxiliary layer (second insulation layer), but not the polymeric auxiliary layer.

The germination of exposed areas of the first insulation layer as claimed, however, is advantageous as compared to the method disclosed in Angelopoulos.

Arbach discloses forming a first electroactive layer and then a second electroactive layer. Subsequently, the second electroactive layer is structured in order to form uncovered (exposed) regions. These exposed regions are activated by seeding and then metallized to form conductor lines.

According to Arbach it is only possible to use materials for the two layers which have a different redox potential, because exactly one activation method is outlined and possible, to wit, activation by using electrons provided with a potential selected such that, by using the potential, it can be assured that only the exposed regions can be activated, not the entire first insulating layer as claimed. This kind of activation shows the disadvantage, for example, that a voltage source and a cabling must be provided, which is eliminated by the method according to the claimed invention. Thus, the process according to the present claimed invention is significantly simpler than the method disclosed in the prior art as typified by Arbach, in particular by eliminating cabling.

It is submitted that if a person of skilled in the art, proceeding from Arbach, was faced with the problem to reduce the quantity of the required seed material, one skilled in the art would not look to Angelopoulos for at least several reasons.

Initially, Angelopoulos discloses a photolithographic method which is in a completely different technological field than Arbach's electrolytic method. This is readily apparent from the distinctly different and separate classifications of the

respective references. There is no matching (corresponding) classes between these references. Also, the use of method steps of a photolithographic method of Angelopoulos in an electrolytic method of Arbach is not technically feasible or practical.

Further, if a person skilled in the art to which the present invention pertains considered Angelopoulos, such person would not find any solution in Angelopoulos for the problem of saving seeding as suggested by the Examiner, because in Angelopoulos more seeding is required since Angelopoulos only teaches the possibility of seeding the entire surface whereas, in Arbach only the select areas to be metallized are seeded. Thus, Angelopoulos detracts from the problem posed by the Examiner and the method disclosed by Arbach and does not at all disclose or suggest an improved method. Therefore, applicants submit that one skilled in the art has absolutely has no technical reason or incentive to use Angelopoulos to modify Arbach as proposed by the Examiner.

If a person skilled in the art had Arbach before him, it is not at all necessary for such person to refer to or rely on Angelopoulos for (performing) an activation step prior to a seeding step, because Arbach already discloses (performing) an

activation step prior to a seeding step. Thus, the person of skill in the art would not get any suggestion at all from Angelopoulos to modify Arbach as proposed by the Examiner.

Moreover, even if the combination of Arbach and Angelopoulos were deemed proper, which applicants submit is not the case, the claimed method would not result from such a combination of references. An additional difference between the claimed method and a method which may result from a combination of Arbach and Angelopoulos as suggested by the Examiner, is, that, in Arbach as well as in Angelopoulos, the region which has been activated during the activation step is seeded immediately after the activation step. In particular, neither Arbach nor Angelopoulos disclose or teach that, between the activation step and the seeding step, a dielectric layer, the second dielectric layer, is applied onto the activated first dielectric layer and is structured as set forth in claim 4.

According to the present claimed method steps, the formation of an additional layer and the structuring of this additional layer do not harm the previously activated first dielectric layer, which means that a subsequent seeding provides a good seeding quality. This claimed feature is not disclosed by Arbach or Angelopoulos. Separating the activation step from

the seeding step by additional method steps as recited in claim 4 provides for good seeding quality and thus good metallization, resulting in a greater flexibility of the claimed method, which is not attainable by the prior art.

As discussed above, Angelopoulos discloses a method for producing a conductive structure. The first dielectric layer (14), which is activated, is applied onto the glass substrate (12). Subsequently, the second layer of polyacrylamid (16) is applied which serves as a bonding agent layer. The seed layer (18) is applied onto the second layer and then the photo resist which is structured. Finally, the seed layer is metallized in partial regions.

It is respectfully submitted that, contrary to the Examiner's assertion, one skilled in the art would not modify Arbach according to Angelopoulos to structure the second photo resist layer, i.e. the second dielectric layer, prior to the application of the seed layer.

As previously discussed, Arbach and Angelopoulos are from non-analagous technical fields. Furthermore, Arbach discloses selective seeding in connection with a previous selective activation by electrons in an electrolytic method. In

particular, a structuring of the second dielectric layer prior to the formation of the seed layer (18) in Angelopoulos has the risk that the polyacrylamid layer (16), which serves the uniform formation of the seed layer, could be at least partially removed in the structuring step. This is further reason why the combination of references is improper.

As previously stated, the combination of the Arbach and Angelopoulos would not result in the claimed method, because Angelopoulos and Arbach solely teach an activation with a direct subsequent seeding of the activated regions. This is distinctly different from the present claimed invention.

A further difference which would result from combining the references as proposed by the Examiner, is that, according to Angelopoulos the activated first dielectric layer is not covered with a seed layer (18), it is the layer made from polyacrylamid (16) (see column 2, lines 7-18, claim 1, and Fig. 1). Thus, even if a person skilled in the art were to structure a second dielectric layer prior to seeding it, the result still would be the claimed method in which the activated first dielectric layer is exposed and then seeded.

According to the present invention, no photo lacquer is applied for the metallization of an insulator, which must subsequently be removed. The second insulation layer (photo-sensitive) remains in those areas where a metallization is formed. Therefore, one process step, the stripping, can be omitted, which lowers the costs of the process.

Such a process is not even suggested by Angelopoulos. According to Angelopoulos the entire polymeric auxiliary layer and not the exposed areas of the activated first insulation layer are seeded and a photo layer is necessary which must be removed after the process. This has the technical disadvantages described in the introduction to the instant specification, in particular that the stripping of the resist leads to particle formation which leads to yield decrease. This particle formation is caused by the remainders of the stripped photo-lacquer that can remain on the substrate.

Furthermore, Angelopoulos neither discloses nor suggests that partial areas of the activated first insulator layer are germinated. Angelopoulos uses an additional polymeric auxiliary layer which is completely seeded. The additionally applied polymeric auxiliary layer is not applied so that this polymeric auxiliary layer is completely and evenly seeded.

The claimed method also has the advantage that less germinating is necessary because only those areas are seeded which are to be metallized. Further, the process step of removing the seed layer in the non-metallized area is not necessary, which, according to Angelopoulos is necessary to prevent short-circuits between the conductor tracks, because Angelopoulos discloses that the entire polymeric auxiliary layer is seeded.

An additional photo-lithographic mask is necessary for removal of the seed layer, which is complementary to the mask, by virtue of which the photo lacquer has been exposed for the structuring of the seed layer. This additional mask also can be omitted from the claimed method.

However, if the Examiner believes that it would also be possible to embody the photo-lithographic step such that the definition of the area of the metallization were carried out in that the areas of the seed layer which are not to be metallized are removed, there is no suggestion or disclosure of this in Angelopoulos (the metallization is always carried out in that the photo lacquer is removed at those locations where a metallization is to take place later) and, secondly,

this method would have the disadvantage that a metallization carried out in such a manner would lead to a problem, namely, that small amounts of metal would deposit in those areas which are not to be metallized and there either create short-circuits or must be removed in an extensive process.

The claimed method has neither of these disadvantages, because the seed layer is only formed in those areas which are subsequently metallized.

Furthermore, according to Angelopoulos, the polymeric auxiliary layer must remain below the embodied conductor tracks, which increases the layer thickness of the entire configuration.

In Angelopoulos the embodied metallization, i.e. the conductor track, is disposed on the substrate in a raised manner, while according to the present invention, the metallization is embodied on the first insulation layer, i.e. sunk in the second insulation layer. A partial insulation of the conductor tracks thus takes place simultaneously with the embodiment of the metallization.

Even if one of ordinary skill in the art were to use Arbach, even though the reference does not pertain to a photo-

lithographic method, he would not obtain any suggestion that a second applied insulation layer, which is subsequently structured, is made of photo-sensitive material. Again, Arbach does not contain any disclosure regarding photo-lithographic process steps.

Contrary to the Examiner's opinion, applicants do not beleive that it would be obvious for one of ordinary skill in the art to modify Angelopoulos to structure the second insulation layer prior to seeding as claimed. According to Angelopoulos, the second insulation layer is applied to carry out a complete even seeding on the second insulation layer. One of ordinary skill in the art thus has no reason to structure the second insulation layer in such a manner so as to seed the first insulation layer, as recited in claim 1, because this defeats the purpose of the second insulation layer.

However, even if the Examiner intends that the second insulation layer is structured so that the areas that are not to be metallized are removed, the above-mentioned disadvantages of the partial metallization of these areas arise. In particular, the method for seeding disclosed in Angelopoulos is only a dipping of the substrate into a solution. With such a dipping, however, it would not be

technically practical or feasible to prevent, without additional processing steps, areas that are seeded to include those areas which are not intended to be seeded. Furthermore, such a process still has the disadvantage that these two insulation layers would remain below the conductor plate, even in the combination of Arbach and Angelopoulos, which increases the thickness of the metallized substrate and which would leave the conductor tracks in a raised state.

In summary, the combination of Arbach and Angelopoulos does not result in the claimed method of seeding the activated first insulation layer.

As compared to Arbach, the claimed method has the advantages that it is not limited to the use of materials having a matching redox-potential for the first and second insulation layer. The entire method of Arbach is based on these different redox potentials because the later activation which according to Arbach is only possible with the reduction by using electrons and the subsequent seeding is only possible in the desired areas.

The combination of Arbach and Angelopoulos does not disclose or suggest activating the first insulation layer before applying the second insulation layer.

On the one hand, the activation of the first insulation layer in Angelopoulos serves for the improved embodiment of the second insulation layer so that a full-surface seeding can be embodied on this second insulation layer. This, however, is not necessary in Arbach. In Arbach, the purpose of the activation is an improved embodiment of seeding directly on the activated first insulation layer. Arbach completely relies on the different redox potentials of the materials of the two insulation layers. These different redox potentials are completely sufficient in order to carry out such a selective activation and subsequent seeding.

On the other hand, the activation steps of the first insulation layer, contrary to the Examiner's assertion, would not suggest to one of ordinary skill in the art that the activation would reduce the amount of the seeding material, because according to Angelopoulos the entire surface of the polymeric auxiliary layer is completely seeded. This, however, means an increase of the required seed material as

compared to the seeding in Arbach, according to which only the areas that are to be metallized, are seeded.

Arbach and Angelopoulos are technologically incompatible and do not contain any information that an activation of the first insulation layer occurs prior to applying the second insulation layer. The advantage arises that it is no longer absolutely necessary to use materials for the first and second insulation layer such that the redox potentials match each other. In an extreme case, the same material can even be used for the first and the second insulator layer.

Bickford, Schupp, Beyne, and Conrad also disclose methods for metallizing insulation layers, where a first insulation layer is activated, and a second insulation is embodied on the first activated insulation layer. The second insulation is subsequently structured so that partial areas of the first activated insulation layer are freed. The partial areas are subsequently seeded and a metalization is then carried out on the embodied seeding. The claimed invention is neither disclosed nor suggested by a combination of Arbach and Angelopoulos and the secondary references.

The references do not show "activating the entire first insulating layer by treatment with an activator, the activator being at least one of a gas, a liquid, a solution, and a plasma; then, after activating the entire first insulating layer, applying and patterning a second insulating layer made of a photosensitive material; and then, after applying and patterning the second insulating layer, seeding and metallizing regions of the first insulating layer that are exposed by the patterning step" as recited in claim 4.

Applicants also wish to point out that it is not apparent from the Examiner's statement at the top of page 5 of the above-identified Office Action, where applicants' acknowledgement on page 10, the first full paragraph appears. In any event, if such a statement exists it is erroneous and resulted from a typographical error. Applicants wish to reaffirm that the cited prior art do not show a method according to the present claimed invention.

It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of claim 4. Claim 4 is, therefore, believed to be patentable over the art and since

all of the dependent claims are ultimately dependent on claim 4, they are believed to be patentable as well.

In view of the foregoing, reconsideration and allowance of claims 4-7 are solicited.

In the event the Examiner should still find any of the claims to be unpatentable, counsel would appreciate receiving a telephone call so that a telephone conference or personal interview may be arranged, and if possible, patentable language can be worked out . In the alternative, the entry of the amendment is requested, as it is believed to place the application in better condition for appeal, without requiring extension of the field of search.

If an extension of time for this paper is required, petition for extension is herewith made.

Please charge any other fees that might be due with respect to Sections 1.16 and 1.17 to the Deposit Account of Lerner and Greenberg, P.A., No. 12-1099.

Respectfully submitted,

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For Applicants

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